

# THE MARYLAND AGRICULTURAL EXPERIMENT STATION

STATE HORTICULTURAL DEPARTMENT.

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## DIRECTIONS FOR THE TREATMENT OF TREES AND PLANTS INFESTED WITH THE SAN JOSE SCALE.

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In the present paper will be found directions for the preparation and use of the three or four best insecticides for the control of the San Jose Scale.

### General Remarks.

If trees are quite badly infested, they should in most cases be at once dug up and burned. Such trees are usually too seriously injured by the scale to make it worth while to attempt to save them. The question of the vitality of the trees should be carefully considered in determining the plan of action. A very severe pruning of the infested trees followed by a thorough spraying will frequently give satisfactory results, particularly if in addition the trees receive good fertilization and cultivation. Good judgment must be exercised in determining whether it is better to destroy an orchard or to attempt to save it by the destruction of the scale with sprays. Where infested trees have been found here and there in an orchard, the scale is in all probability much more generally distributed than an inspection would indicate. Under these circumstances, it would be better to spray the entire orchard, and in any case, spraying should not be confined to trees seen to be infested, but all those in the immediate neighborhood should be treated. As a rule, spraying is not done with sufficient thoroughness to secure the best results. It should always be borne in mind that the scale is not killed unless actually hit by the spray mixture. Special pains therefore should be taken that every part of the tree, from the crown to the top-most branches, be treated. When rather high trees are to be sprayed, an extension pole is necessary, by which means, the nozzle may be elevated sufficiently high to spray the higher parts of the tree. Much inferior work has also resulted from the fact that the hose leading from the spray pump has not been of sufficient length. For a barrel pump, the hose should be at least 20 or 25 feet long. A hose of such length will enable the sprayer to get quite around an average orchard tree, with the wagon standing between the rows, and finish the tree before leaving it. The work is thus likely to be much more thorough

than if but one side of the tree is sprayed at a time, as is necessary with a ten-foot hose. A barrel pump is much the most satisfactory size for orchard use, as it is possible to secure the necessary force for thorough work.

(1). Lime, Sulphur and Salt Wash.

Experiments in many of the Eastern States the past year indicate that this is a most efficient spring treatment for the San Jose scale. The wash may be made according to the following formula:

Best Unslackened Lime.....	30 pounds.
Flour Sulphur.....	15 pounds.
Stock Salt.....	12 pounds.
Water to make.....	50 gallons.

Directions.—Place ten pounds of lime and all of the sulphur in a boiler containing twenty gallons of water, and boil over a brisk fire for not less than one hour and a-half, or, until the sulphur is thoroughly dissolved. When this takes place the mixture will be of an amber color. Next, place in a cask twenty pounds of unslackened lime, pouring over it enough hot water to thoroughly slack it, and, while it is boiling, add the twelve pounds of salt. When the salt is dissolved, add the lime and salt mixture thus prepared to the lime and sulphur in the boiler, and cook for half an hour longer when the necessary amount of hot water to make the fifty gallons should be added.

This formula, it will be observed, is reduced from the standard formula given, to the amount of materials required for fifty gallons of wash, since this is the amount required to fill an ordinary barrel spray pump. In pouring the wash into the barrel, it should be well strained, to remove any particles of lime that may not have dissolved, and a fine wire strainer should be used. This wash may be more conveniently cooked by the use of steam, where a steam engine of any kind is available. Many orchardists could doubtless afford to purchase small, steam boilers, as steam food-cooking boilers, for the preparation of this wash. A boiler may be secured of sufficient size to cook two or three barrels of the wash at the same time, at a cost of from thirty to forty dollars. Best results will come from the use of the wash if applied to the trees in the spring, somewhat before the buds begin to swell. It is a very caustic treatment, and consequently can be used on trees only when in a practically dormant condition. In addition to being a most efficient insecticide, the lime, sulphur and salt wash is stated to be very effective in controlling peach leaf curl. This is probably the cheapest treatment for the scale at present available, but it should be understood that it is somewhat troublesome to make and to apply. The barrel "Pomona," "Century," "Peerless," and "Eclipse" spray pumps are all excellent for the application of this wash. It is essential that the pump have a strong agitator, otherwise the sediment will be inclined to settle on the bottom of the barrel.

## (2). Whale Oil Soap.

This is a most satisfactory substance to use against the San Jose Scale, but its cost has doubtless prevented its more general adoption. Where a few trees are to be treated or washed, the whale oil soap is to be preferred from the fact that it may be secured and kept in any desired quantity, and is so readily prepared. It is dissolved in hot water and may be applied in the form of a spray as are other washes, or where practicable, be painted on the trees with a brush, or scrubbed on with a cloth. On pear and apple trees the soap solution should be used at the rate of two pounds to each gallon of water, and may be applied any time during the winter. For peach and plum, however, it should be used at the rate of one and one-half pounds of soap to the gallon of water, and it should not be applied until shortly before the buds begin to swell in the spring. There are several brands of whale oil soap on the market, but we have found Good's potash whale oil soap No. 3, manufactured by James Good, 939-941 North Front Street, Philadelphia, Pa., to be most satisfactory, and dissolving sufficiently to be readily sprayed while warm at the rate of two or even three pounds of soap to the gallon of water. In any event, a potash soap should be purchased as the soda soaps are likely to become more or less solidified when cold, and hence cannot be used in spray pumps. Good's potash whale oil soap may be purchased of the manufacturer at from three to five cents per pound, depending on the quantity ordered.

## (3). Kerosene.

Ordinary illuminating or coal oil, in 20 per cent. mechanical mixture with water is being quite largely used at the present time against the scale. It has proven satisfactory, on the whole, in Western Maryland, where, at the present time, it is probably the main reliance. From several localities on the Eastern Shore and the tide water section generally, there has come complaint of severe injury to the trees treated. Kerosene, therefore, should be used with considerable caution, and where past experience has shown it to be injurious, the lime, sulphur and salt wash, or whale oil soap should be substituted. One of the serious difficulties in the use of kerosene, in mechanical mixture with water, is the fact that the "kerowater" pumps, thus far put on the market, have been more or less unreliable; that is, many of the pumps fail to discharge the desired per cent. of oil as indicated by the "set." It thus results that the trees may be injured by an excessive per cent. of oil, or, on the other hand, the per cent. may not be sufficiently high to be effective against the scale. In using any pump, making the mechanical mixture of kerosene and water, it should be tested from time to time, by spraying some of the mixture in an ordinary, cylindrical, fruit jar. After allowing the jar to stand for a while, the oil will have separated to the top of the water, and the per cent. may be readily determined by the use of a rule. For the use of kerosene in mechanical mixture with water, we have found Gould's "Kerowater" pump to be the most reliable of any thus far tested.

## (4). Kerosene Emulsion.

Any desired per cent. of kerosene in a wash may be accurately secured by making a kerosene emulsion. The 20 per cent. kerosene emulsion in quantities of fifty gallons should be made up as follows:

Water .....	5 Gallons.
Ordinary hard soap.....	1 $\frac{1}{2}$ Pounds.
Kerosene (150 degrees) .....	10 Gallons.

Pour ten gallons of kerosene in the spray pump barrel. Slice the soap and dissolve in the water, which should be heated to the boiling point. Pour the hot water into the spray pump barrel, and thoroughly emulsify by pumping the mixture back into itself for ten or twelve minutes, moving the nozzle around all the while. The emulsion, when properly made, should be of a creamy-white consistency, and may be diluted with any desired quantity of water without the oil separating to the top. If thirty-five gallons of water, making fifty gallons in all, are added, there will be a twenty per cent. kerosene emulsion. This may be used instead of kerosene in mechanical mixture with water, as mentioned above. This is an effective spring treatment for the San Jose scale, and should be applied before the buds open in the spring. Kerosene emulsion may be applied with an ordinary spray pump, such as the one used for the lime, sulphur and salt, or it may be painted or rubbed on infested trees as mentioned for whale oil soap. Where it is desired to make a less quantity than indicated, the formula may be reduced, by simply observing the proper proportions.

Kerosene emulsion may also be used as a summer treatment on trees or plants infested with the San Jose scale, but should be applied on bright, sunshiny days. In our experience, no injury has resulted to trees so treated.

## (5). Spray Pump Manufacturers.

Before buying a spray pump, get catalogs of the following firms, and order the pump best suited to your needs: Griffith & Turner, Baltimore, Md.; Morrill & Morley, Benton Harbor, Mich.; Deming Co., Salem, Ohio; Bean Chamberlain Mfg. Co., Hudson, Mich.